

MATERIAL STANDARD**CAPACITOR: 26 KV, 1,200 KVAR, THREE-PHASE, POLE-MOUNTED****1. Scope**

This specification applies to the furnishing of pole-mounted, three-phase 1,200 kvar shunt capacitors for a 26Y/15 kv solid grounded neutral distribution system. The completed assembly shall have three switches and be completely prewired (both the capacitor and the switch control circuits).

2. General

The capacitors furnished under this specification shall meet all applicable ANSI, NEMA, and OSHA standards except as modified by this specification.

3. Rating

3.1 The reactive rating shall be 1,200 kvar.

3.2 The voltage rating shall be 26,400 Grd. Y/15,240.

4. Insulation Levels

4.1 The insulation level of all live parts (except the control circuits) shall be 125 kv BIL.

4.2 The RIV of the switch shall not exceed 250 microvolts at 17.4 kv.

4.3 The RIV of the completed assembly shall not exceed 250 microvolts at rated voltage.

5. Insulating Materials

5.1 The charged surfaces shall be separated by high-voltage film.

5.2 The insulating compound shall be low in toxicity and be biodegradable. Polychlorinated byphenyls (Askarels) or other chlorinated hydrocarbons are not acceptable and will be considered as noncompliant with this specification.

5.3 The insulating compound shall have a PCB level of less than 1 ppm, and a decal or tag shall be affixed to each capacitor tank in a prominent place confirming this PCB level.

6. Capacitor Units

6.1 Each capacitor unit shall be constructed with internal discharge resistors that will reduce the residual voltage to 50 volts or less within five minutes.

6.2 Each capacitor bank shall be provided with a two bolt cable to flat grounding terminal located on the pole side of the frame and capable of accepting a minimum of three #4 AWG copper jumpers.

6.3 Each capacitor unit shall be made up of 200 kvar single-phase units and have two bushings with no internal grounds. Bids will not be accepted for three-phase units. Each of the two bushings shall have at least a 17-inch creepage distance, be colored sky gray, and be supplied with insulating caps.

6.4 All terminals and connectors shall be copper with plating for bimetallic connections.

7. Oil or Vacuum Switches

7.1 The switches shall have a continuous rating of 200 amperes and be designed for interrupting this reactive current.

7.2 The switch bushings shall have at least 17-inch creepage distance, be sky gray in color, and be supplied with insulating caps.

7.3 The control voltage shall be 120V.

7.4 The switches shall be McGraw-Edison type NR, G.E. type FKC 2, Joslyn VerSaVac Vacuum, Westinghouse type CRS, or prior user approved equal.

ORIGINATOR

STANDARDS COORDINATOR

STANDARDS SUPERVISOR

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8. Completed Assembly

- 8.1 Each assembled bank shall consist of capacitors and switches mounted on a bracket suitable for pole mounting.
- 8.2 A common junction box shall be mounted on the pole mounting. All control wiring shall be terminated in this junction box.
- 8.3 The completed assembly shall be painted with a semi-gloss dark green, similar in color to Munsell 7GY 3.29/1.5 and shall be highly resistant to oil and weathering. Reasonable color variations are acceptable on approval. A sky gray may be furnished only as an alternative with prior user approval.

9. Nameplates

Corrosion-proof nameplates shall be attached to each capacitor unit.

10. Warranties

Should any capacitor unit, oil switch, or other related components fail within one year after installation, it shall be repaired or replaced promptly at the expense of the supplier.

11. Patents and Infringements

The manufacturer shall defend the Seattle Lighting Department against any litigation arising from all patent infringements of the equipment furnished. If such equipment is judged as infringing, the manufacturer shall either secure for the Lighting Department the right for its continued use, or replace it with non-infringing devices that comply with this specification at no cost to the Seattle Lighting Department.

12. Data to be Supplied with Bid

- 12.1 Average losses in watts per kvar at 30°C ambient temperature after eight hours of energization. Losses due to the internal discharge resistors shall be included in these electrical losses.
- 12.2 Outline drawings of the assembled bank including capacitor unit dimensions.
- 12.3 Type of insulating compound used and the toxicity and biodegradability of same. Bidder shall supply a completed OSHA Form 20, "Material Safety Data Sheet." Also the following additional information shall be supplied.
 - a. Results of all known tests on acute toxicity on mammals and fish, e.g., LD50 for 14-day old rats and for bluegill.
 - b. Results of all known tests on subacute or chronic toxicity, based on prolonged feeding to mammals and fish.
 - c. Results of all tests on biodegradability, e.g., the standard River Die Away Test, and bioaccumulation after prolonged exposure.
 - d. Results of all tests for carcinogenicity, mutagenicity, teratogenicity, embryotoxicity, and fetotoxicity, if available.
 - e. Planned studies or studies in progress, either by the manufacturer, independent parties, or as a result of the TSCA Testing Committee's recommendations by EPA.
 - f. Required disposal procedures and other recommended or required handling precautions.
- 12.4 Field experience on failure rates.
- 12.5 Data on proposed oil or vacuum switch to be used.
- 12.6 The following capacitor design details shall be included in the bid proposal:
 - a. Capacitor unit working voltage.
 - b. Number of series sections in capacitor unit.
 - c. Rated voltage between foils.

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- d. Number of sheets of film, paper film, or paper between foils.
- e. Thickness of each sheet of film, paper-film, or paper between the foils - in mils.
- f. Total paper and/or film thickness between foils - in mils.
- g. Dielectric stress of paper, paper film, or paper - in volts per mils.
- h. A graph showing average watts loss/kvar vs. ambient temperature from -40° C to +40° C for a 200 kvar unit for a 10-hour energization period.
- i. A graph showing watts loss vs. temperature from -40° C to +40°C for a 200 kvar unit after eight hours of energization.

13. Award of Bid

The award of the purchase order shall be based on the following:

- 13.1 Bid Price
- 13.2 Losses evaluated at \$2,800 per kilowatt.
- 13.3 Overall appearance of assembled bank. A compact silhouette is desired.
- 13.4 Evaluation of design details as covered in Section 12.6.
- 13.5 The data submitted with the bid.
- 13.6 The bidder's qualifications.
- 13.7 Special disposal and handling procedures required or recommended by the manufacturer or government agency.
- 13.8 The extent of the warranties and guarantees.

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